An affordable single-socket, quad-core server with high performance and data protection for small, medium, and large businesses

Product Guide
October 2010

IBM System x3200 M3

Product Overview

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Value-priced performance, capacity and availability

Suggested uses: *Small and medium businesses, distributed large enterprises, retail, banking, and insurance companies seeking scalability, top performance, and enterprise-class availability features at an entry-level price.*

The **single-socket** IBM® System **x3200 M3**, incorporating IBM **X-Architecture®** features, is an affordable, single-socket tower server that offers more performance, configuration flexibility and availability features than many other servers in its class. From network infrastructure to distributed applications to front-end workloads, the x3200 M3 is designed to meet a wide range of business needs and help you adapt to changing business requirements.

It supports, at the high end, the latest **quad-core** Intel® **Xeon®** 3400 Series processors, designed with speedy **1333MHz** memory access (FSB) and **8MB** of L3 cache, to help provide the computing power you need to match your business needs and growth. For power-constrained environments, a **low-voltage, dual-core Xeon** processor is also available, with **4MB** of cache. If cost is your primary concern, the x3200 M3 offers a model using the affordable **dual-core Celeron** processor with **2MB** of L3 cache. In between, there are models that use the **dual-core Pentium** processor with **3MB** of L3 cache, as well as a **dual-core Core i3** processor with **4MB** of L3 cache. All models are designed with an integrated memory controller for greatly improved memory performance (up to **1333MHz** access, depending on the processor), **64-bit extensions** (**EM64T**), and multithreading, to provide the computing power you need to match your business needs and growth. In addition, the x3200 M3 uses industry-standard **1066**/**1333MHz DDR3 ECC** (Error Checking and Correcting) memory—for high performance and reliability.

All models offer impressive scalability, including up to **32GB**[1] of memory and up to **four 3.5-inch hot-swap** *enterprise-class* Serial ATA II (**SATA II**) hard disk drives with a total capacity of up to **8TB**[2]**,** or up to **four 3.5-inch simple-swap** *enterprise-class* **SATA II** hard disk drives with a total capacity of up to **8TB**, or **eight 2.5-inch hot-swap SAS** drives with an internal storage capacity of up to **4.8TB**.

For additional performance and high availability, the x3200 M3 offers integrated hardware **RAID-0**/**1** support standard in the *hot-swap* SAS/SATA models (optional for *simple-swap* SATA models), and optional **RAID-10**/**5**/**6**. To meet your backup requirements, the x3200 M3 supports a choice of **half-high tape drives**, an optical drive, or an IBM **RDX Removable Hard Disk Storage System**. The server ships as a tower unit; an optional **rack conversion kit** turns the x3200 M3 hot-swap models into a **5U** rack-mounted server to save precious data center floor space.

Standard in the x3200 M3 is the **Integrated Management Module (IMM)** that enables the user to manage and control the server easily—both locally and, using the optional **Virtual Media Key**, remotely. The IMM offers a high level of manageability that is designed to keep costs down and the system up—even when network usage increases. These advanced features help maximize network availability by increasing uptime, as do **hot-swap** and **simple-swap SATA HDDs**; **hot-swap**/**redundant SAS HDDs**, redundant ultra-efficient **power supplies**; integrated **RAID**; **redundant power**[3]; **IPMI 2.0** support, including **highly secure remote power control** and **Serial over LAN**; as well as **text-console redirect over LAN**.

Another improvement with the new generation of X-Architecture is the replacement of legacy BIOS with next-generation **United Extensible Firmware Interface** (UEFI). UEFI provides a more intuitive user interface and understandable event logs and better management.

With the inclusion of unique IBM service and support features such as the IMM, **IBM**

[1] Using RDIMMS.
[2] GB equals 1,000,000,000 bytes and TB equals 1,000,000,000,000 bytes when referring to hard disk drive capacity. Accessible capacity may be less.
[3] A second high-efficiency redundant 430W power supply is available for the x3200 M3. (Model dependant or via CTO.)

Please see the Legal Information section for important notices and information.

Systems Director, **IBM Systems Director Active Energy Manager**™, and **IBM ServerGuide**™, the x3200 M3 is designed for superior uptime.

For a balance of high-performance processing, high availability and vast internal storage at a budget price, the x3200 M3 is the ideal system.

Selling Features

Price/Performance

The x3200 M3 offers numerous features to boost performance and reduce product and operating costs:

- Models with a **quad-core Xeon** processor, high-end **1333MHz** memory access, and **8MB** of L3 cache, offer peak performance, capable of tackling the toughest jobs.
- Models containing a high-performance **dual-core Core i3** processor, with high-end **1333MHz** memory access and **4MB** of L3 cache, offer superior performance at an aggressive price.
- Models containing a **dual-core Celeron** or **Pentium** processor with speedy **1066MHz** memory access, for those on a budget.
- Ultra-fast **1333MHz** or **1066MHz DDR3** ECC memory offers high speed and high availability.
- **High-speed PCIe** adapter slots offers investment protection by supporting high-performance adapters, such as Ethernet, Fibre Channel and InfiniBand cards, none of which will run in older legacy PCI slots.
- Integrated *hardware* **RAID-0**/**1** support (standard in hot-swap models; optional in simple-swap models) doesn't consume a valuable adapter slot. RAID-0 offers improved disk performance via data striping and RAID-1 offers disk mirroring for high availability.
- Gen 2 HDD cage support for up to **four hot-swap 3.5-inch SAS** or **SATA** hard disk drives or up to **eight hot-swap 2.5-inch SAS** HDDs (CTO/special bid), offers high-performance and large capacity with high availability. The SAS/SATA controller provides full-duplex (**2 x 300MBps**) data transfers for SAS drives. For lower cost with high capacity, other models support up to **four simple-swap SATA** drives.
- The two integrated single-port **Gigabit Ethernet** controllers with **IPMI 2.0** support provide high-speed network communications.
- A **high degree of device integration**, including SAS/SATA, RAID-0/1/1E, Gigabit Ethernet, IMM systems management, and video controllers, lowers costs and frees up valuable adapter slots.

Flexibility

The x3200 M3 has the ability to grow with your application requirements, thanks to:

- A choice of one **quad-core Xeon** processor with **2.4** to **3.06GHz** clock rate, **8MB** of L3 cache, and up to **1333MHz** memory access, or a **dual-core Celeron, Pentium** or **Core i3** processor with a **2.26** to **3.20GHz** clock rate, **2MB** to **4MB** of L3 cache, and **1066MHz** or **1333MHz** memory access.
- A choice of **73W** dual-core or **95W** quad-core processors.
- Up to **32GB** of high-speed DDR3 system memory.
- **Five** *available* adapter slots: **two PCIe x8**, **two PCIe x4** (one PCIe slot is reserved for a ServeRAID controller) and **two legacy PCI** (32-bit, 33MHz) slots in all models.
- The **seven USB 2.0** ports (two front, four rear, one internal) are up to **40X** faster[4] than older **USB 1.1** ports. This provides speedy access to external HDDs (non-arrayed), optical drives, tape drives, and other USB devices. The internal port can be used for an optional tape drive, disk cartridge backup device or USB key with embedded hypervisor.
- **Up to four** internal **3.5-inch simple-swap SATA** or **hot-swap SAS or SATA HDDs** or **eight 2.5-inch hot-swap SAS HDDs** (by special bid only), can be installed. This provides tremendous internal storage capability, along with full data backup.
- Alternatively, iSCSI or Fibre Channel-attached storage can be attached using **IBM System Storage**® servers.

Manageability

Powerful systems management features simplify local and remote management of the x3200 M3:

- The x3200 M3 includes an **Integrated Management Module (IMM)** to monitor server availability, perform Predictive Failure Analysis, etc., and trigger IBM **Systems Director** alerts. The IMM performs the functions of both the mini Baseboard Management

[4] Data transfer rates may be less than the maximum possible.

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Controller (mBMC) of earlier systems and the Remote Supervisor Adapter II and is upgradeable to **remote presence/cKVM.**

- An optional **Virtual Media Key** provides additional systems management capabilities, including virtual floppy and optical drive support; graphical console redirection over LAN; and remote redirection of PCI video, keyboard and mouse (cKVM). And it does all this without consuming a valuable adapter slot.
- Integrated industry-standard Unified Extensible Firmware Interface (**UEFI**) next-generation BIOS. New capabilities include:
  - Human readable event logs; no more beep codes
  - Complete setup solution by allowing adapter configuration function to be moved into UEFI
  - Complete out-of-band coverage by Advance Settings Utility to simplify remote setup
- Integrated **IPMI 2.0** support alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions. It also supports **highly secure remote power control** using data encryption.
- **Text Console Redirection** support allows the administrator to remotely view x3200 M3 text messages over Serial or LAN.
- The completely redesigned **IBM Systems Director** is included for proactive systems management. IBM Systems Director comes with a portfolio of tools, including **IBM Systems Director Active Energy Manager**, **Service and Support Manager**, and others. In addition, IBM Systems Director offers extended systems management tools for additional server management and increased availability. When a problem is encountered, IBM Systems Director can issue administrator alerts via e-mail, pager, and other methods.
- IBM **Systems Director Active Energy Manager**, an IBM-exclusive, is designed to take advantage of new system power management features, by providing actual realtime energy monitoring and reporting features. The optional (CTO/special bid) 431W hot-swap power supply is AEM-supported.
- The x3200 M3 optionally supports **remote presence/concurrent KVM (cKVM)** and **concurrent media (cMedia)** access by multiple administrators at once, via the IMM. This feature requires an upgrade, via the Virtual Media Key.
- **Trusted Platform Module** (TPM) 1.2 support.

Availability and Serviceability

The x3200 M3 provides many features to simplify serviceability and increase system uptime:

- **Toolless cover removal** provides easy access to upgrades and serviceable parts. Similarly, the Virtual Media Key and the **ServeRAID-BR10il** controller can be installed and replaced without tools. This means less time (and therefore less money) spent servicing the x3200 M3. Similarly, **hot-swap/redundant HDDs, fan modules** and **power supplies**, as well as **online mirrored** memory, mean greater system uptime while these components are being serviced.
- A **lighted LED beside each DIMM slot** indicates a working DIMM. When a DIMM fails, the LED goes out. This.quickly leads the technician to the failed DIMM and simplifies servicing, speeds up problem resolution and helps increase server availability.
- **Integrated RAID-1/1E disk mirroring** standard in hot-swap models enable the server to keep operating in the event of a failure to any one drive. (RAID-1E, an IBM exclusive, supports mirroring of an odd number of drives.)
- **IPMI 2.0** supports highly secure remote system power control using data encryption. This allows an administrator to restart a server without having to visit it in person, saving travel time and getting the server back up and running quickly and securely. It also adds new features to those provided by IPMI 2.0, including **VLAN** support, **Serial over LAN**, enhanced authentication and encryption algorithms (**RMCP+**, **AES**) and a **firmware firewall**.
- The **three-year (parts and labor) limited onsite warranty**[5] offered on selected models (Machine Type **7328**) offers peace of mind and greater investment protection than a one-year warranty does.

[5] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

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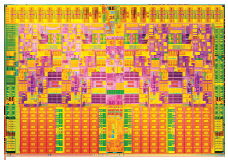
Key Features



Multicore Intel Processors

The x3200 M3 supports one of the latest **Intel Xeon 3400 Series** processors, allowing you to choose the most appropriate processor for your business needs. The x3200 M3 offers a choice of processor clock rates, memory access speeds and power draws:

- **95W quad-core Xeon** processor models **X3430**, **X3440**, **X3450**, **X3460**, **X3470***, or **X3480*** running at **2.4, 2.53**, **2,66**, **2.8, 2.93**, or **3.06GHz** (respectively), with *efficient power draw* (**23.75W** per core), a **1333MHz** FSB, **8MB** of L3 processor cache, and Turbo Boost Technology
- **30W** dual- core **low voltage Xeon** processor model **L3406*** running at **2.26Ghz** with low power draw (**15W** per core), a **1066MHz** FSB, plus **2MB** of L3 processor cache
- **73W** dual-core **Core i3** processor models **530**, **540***, or **550*** running at **2.93**, **3.06**, or **3.20GHz** (respectively), with *reduced power draw* (**36.5W** per core), a **1333MHz** FSB, plus **4MB** of L3 processor cache
- **73W** dual-core **Pentium** processor model **G6950*** running at **2.8GHz**, with *reduced power draw* (**36.5W** per core), a **1066MHz** FSB, plus **3MB** of L3 processor cache
- **73W** dual-core **Celeron** processor model **G1101** running at **2.26GHz**, with *reduced power draw* (**36.5W** per core), a **1066MHz** FSB, plus **2MB** of L3 processor cache

* Processor available via Configure-to-Order (CTO) process.

The **dual-core** processors contain **two complete processor cores**; **quad-core** processors, similarly, contain **four** cores. The processors also contain one shared cache. The shared cache is dynamically allocated between cores as needed. The cores appear to software as physical processors. The two-core processors offer considerably higher performance than a same-speed Xeon processor with a single core. Likewise, four-core processors offer considerably higher performance than a same-speed Xeon processor with two cores.

Note: Because of the integrated memory controller the former front-side bus (FSB) no longer exists.

Turbo Boost Technology increases performance by translating the temperature, power and current head room into higher frequency. It will dynamically increase by 133MHz for short and regular intervals until the upper limit is met or the maximum possible upside for the number of active cores is reached. The maximum frequency is dependent on the number of active cores. The amount of time the processor spends in the Turbo Boost Technology state depends on the workload and operating environment, providing the performance you need, when and where you need it.

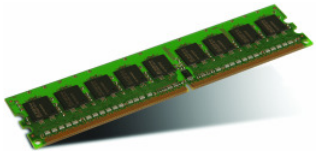
In processors implementing **Intel Hyper-Threading Technology**, each core has two threads capable of running an independent process. Thus, a 6-core processor can run **12** threads concurrently.

Intel **Extended Memory 64 Technology (EM64T)** 64-bit extensions allow the Xeon processor to use large memory addressing when running with a 64-bit operating system. This in turn lets individual software processes directly access more than 4GB of RAM, which was the limit of 32-bit addressing. This can result in much higher performance for certain kinds of programs, such as database management and CAD. Additional registers and instructions (SSE3) can further boost performance for applications written to use them. Contact your software providers to determine their software support for EM64T.

Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.

Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.

High-Performance, Low-Latency DDR3 ECC Memory



The x3200 M3 ships with either one or two DIMMs installed and supports up to **32GB** of Registered DIMM (**RDIMM**) memory in **6** DIMM sockets, or up to **16GB** of Unbuffered DIMM (**UDIMM**) memory in **4** sockets. It uses **PC3-10600** or **PC3-8500R-777** double data rate III (**DDR3**) memory (operating at **800**, **1066**, or **1333MHz**. depending on the processor type and memory configuration) for faster access, and provides ECC memory protection.

The x3200 M3 supports either **1**, **2**, or **4** UDIMMs, or **1**, **2**, **4** or **6** RDIMMs. Valid configurations include:

- **UDIMMs** in Slot 1 only, or Slots 1 and 4, or Slots 1, 2, 4, and 5. (16GB maximum)
- **RDIMMs** in Slot 1 only, or Slots 1 and 4, or Slots 1, 2, 4, and 5, or all 6 slots. (32GB maximum)

UDIMMs are available in kits consisting of *one* **1GB DIMM** or *two* **1GB**, **2GB**, or **4GB**

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DIMMs. **RDIMMs** are available in kits consisting of *one* **1GB DIMM** or *two* **1GB**, **2GB**, **4GB**, or **8GB** DIMMs. Mixing UDIMMs and RDIMMs in the same server is not supported. Mixing ECC and non-ECC UDIMMs *is* supported; however the result will be all DIMMs operating in non-ECC mode.

The x3200 M3 supports both **single**- and **dual-rank UDIMMs**. **Single**-, **dual-**, and **quad-rank RDIMMs** are supported. Up to **6** single- or dual-rank RDIMMs, or up to **4** quad-rank RDIMMs can be used. Maximum capacities include:

- **4 single-**rank **UDIMMs** (4 x 2GB = 8GB)
- **4 dual-**rank **UDIMMs** (4 x 4GB = 16GB)
- **6 single-**rank **RDIMMs** (6 x 2GB = 12GB)
- **6 dual-**rank **RDIMMs** (6 x 4GB = 24GB)
- **4 quad-**rank **RDIMMs** (4 x 8GB = 32GB)

Integrated Virtualization

All models of the x3200 M3 support an optional **USB 2.0 Flash Key** installed preloaded with **VMware vSphere Hypervisor** (formerly ESXi). Rather than management through a Service Console based on a Linux operating system, vSphere Hypervisor relies on aggregate management tools, including VirtualCenter, the Remote Command Line interface and the introduction of CIM for standards-based and agentless hardware monitoring.

vSphere Hypervisor includes all the performance, scalability and compatibility features of a hypervisor installed on disk, including full **VMFS** support across FC SAN, iSCSI SAN, and NAS, and **4-way VSMP**. Because it runs from flash memory, it's extremely fast and ideal for diskless configurations. It also offers enhanced security, because it runs without an operating system-based console and is updated/patched much like firmware.

Gigabit Ethernet Controller

The x3200 M3 includes **two** integrated single-port **Intel 82574L** Gigabit Ethernet controllers for up to 10X higher maximum throughput than a 10/100 Ethernet controller. The controller provides fully integrated Media Access Control (MAC) and Physical-Layer (PHY) capabilities that can be configured for either 1000Mb/s or 10/100 Mb/s modes of operation. The first port supports the **IMM** systems management functions.

The controller also supports **Wake on LAN®** and **PXE** (Preboot Execution Environment) flash interface. Optional PCI adapters offering failover and load balancing between adapters are available for added throughput and increased system availability.

Hot-Swap/Redundant Components

System availability is maximized through the use of hot-swap and redundant components, including:

- **Hot-swap/redundant** or **simple-swap hard disk drives** (with **RAID-1/1E** protection standard)
- **Hot-swap, redundant power supplies** (model-specific or via CTO)

Large HDD Storage Capacity

The x3200 M3 offers a choice of disk storage, supporting up to **four 3.5-inch simple-swap** or **hot-swap** Serial ATA II (**SATA II**) drives, or **four 3.5-inch hot-swap** high-performance Serial-Attach SCSI (**SAS**) drives, or up to **eight 2.5-inch hot-swap SAS** drives (via CTO).

3.5-inch Hot-Swap SAS

- **15,000** RPMs — 300, 450, or **600GB** (**2.4TB** maximum capacity)
- **7,200 RPMs —** 1 or **2TB** (**8TB**)

3.5-inch Hot-Swap SATA

- **10,000** RPMs — 250, 500 or **750GB** (**3TB**)
- **7,200** RPMs — 1 or **2TB** (**8.0TB**)

3.5-inch Simple-Swap SATA

- **10,000** RPMs — 250, **500GB** (**2TB**)
- **7,200** RPMs — **2TB** (**8.0TB**)

2.5-inch Hot-Swap SAS (3Gbps or 6Gbps)

- **15,000** RPMs — 73.4 or **146.8GB** (**1.17TB**)
- **10,000** RPMs — 146.8, 300, or **600GB** (**4.8TB**)

- **7,200** RPMs — 160 or **500GB** (**4TB**)

Notes: Enterprise-class 500GB or higher SATA drives offer increased reliability compared to lower-capacity SATA drives. Simple-swap SATA drives are *not* hot-swappable (the system must first be powered off); however, no tools or jumpers are required for installation and removal, allowing for faster, simpler servicing than fixed drives. Hot-swap SAS drives use the Converged Tray for interchangeability with other IBM System x® systems.

If you need more storage space, terabyte capacities are possible with external direct-attach, NAS, and SAN solutions.

Drive Bays

Some x3200 M3 models (**3.5**-inch HDD models) contain **7** drive bays, while others (**2.5**-inch HDD models for CTO, via special bid) provide **11** drive bays. All models offer **two 5.25-inch** bays, **one 3.5-inch** floppy drive bay, and either **four 3.5**-inch HDD bays or **eight 2.5**-inch HDD bays (via CTO). Some models support up to **four hot-swap SAS/SATA** or **simple-swap SATA** drives; other models support up to **four simple-swap SATA** drives.

An optical drive with a SATA interface ships standard in one 5.25-inch bay. The other 5.25-inch bay supports one of several backup options: a **half-high tape** drive, a **DVD-ROM** drive, or an **RDX Removable Hard Disk Storage System**. An internal USB port is provided standard for use with a tape drive or **USB key with embedded hypervisor**. An *external* USB floppy drive may be used, if needed.

Hot-swap and simple-swap drives may be inserted or removed through the front of the server. **Hot-swap** drives *do not* require powering off the system. **Simple-swap** SATA drives *do* require powering off the system first; however, no tools or jumpers are required for installation and removal, allowing for faster, simpler servicing than fixed drives.

For still more storage, a direct-attach, iSCSI, or SAN external expansion option can be added, using an optional controller.

Disk/Tape Controllers

Hot-swap x3200 M3 models include an integrated **x4** PCIe **ServeRAID-BR10il V2 SAS/SATA Controller** that offers hardware **RAID-0/1/1E** support in a dedicated x8 PCIe slot. The controller supports up to **four 3.5-inch** or **eight 2.5-inch** internal **SAS** LVD (low-voltage differential) **hot-swap** drives, and provides data transfer speeds of up to **6Gbps**[6] in *each* direction (**full-duplex**) for **SAS** drives. The serial design of the SAS bus allows maximum performance to be maintained as additional drives are added. This controller also supports up to **four** Serial ATA **(SATA)** drives at **6Gbps half-duplex**.

Simple-swap models include a **SATA** controller, integrated into the Intel chipset. The controller, supports up to **four** internal **simple-swap** LVD **SATA II** drives at **6Gbps** (**half-duplex**) throughput. A dedicated SATA port is available for use with an **internal tape drive**. Optional ServeRAID adapters offer additional capabilities and performance.

The **6Gbps** (x8 PCIe) **ServeRAID-M1015 SAS/SATA** controller supports **RAID-0/1/10** (no cache) for up to 16 drives. The **ServeRAID M1000 Series Advance Feature Key** adds **RAID-5** and **SED** support.

The **6Gbps** (x8 PCIe) **ServeRAID-M5014 SAS/SATA** controller offers enhanced performance with **256MB** of cache memory, and supports **RAID-0/1/10/5/50** for up to 16 drives**.**

The **6Gbps** (x8 PCIe) **ServeRAID-M5015 SAS/SATA** controller offers enhanced performance with **512MB** of cache memory and battery backup, and supports **RAID-0/1/10/5/50** for up to 16 drives.

The **ServeRAID M5000 Series Advance Feature Key** adds **RAID-6/60** with **SED** support to the M5014 and M5015. The **ServeRAID M5000 Series Battery Key** adds **battery backup** support to the M5014.

The **6Gbps ServeRAID-M5025** is similar to the ServeRAID-M5015, but adds support for up to **9 external System Storage EXP3000** expansion units).

All models provide a dedicated internal USB port for a USB key with embedded hypervisor.

Internal Backup

The x3200 M3 supports several internal SAS/SATA- or USB-attached **half-high backup** options. Supported technologies include:

- **IBM 36/72GB DDS-5** (SATA)
- **IBM DDS-6** (USB)

[6] Data transfer rates depend on many factors and are often less than the maximum possible.

- **IBM RDX Removable Hard Disk Storage System** (USB)—external version also available
- **IBM HH 400/800GB LTO-3** (SAS)

High-Performance Adapter Slots

The x3200 M3 offers **six** total adapter slots. **Three PCIe** (PCI Express) **Gen 2 full-length/full-height** adapter slots are provided for general use. **PCI Express** Gen 2 is the next generation of high-performance, low-latency, serial I/O bus. Two slots are **x8** ("by 8") **Gen 2** slots; that is, **x8** physical and **x8** electrical (**8GBps**) slots, capable of supporting **x1**/**x4**/**x8** adapters at their native speeds. Another slot is a **x4**/**x1** PCIe **Gen 2** (**1GBps**) slot, capable of accepting **x1** or **x4** adapters[7]. **Two** other slots are **full-length/full-height** legacy **33MHz PCI** slots.

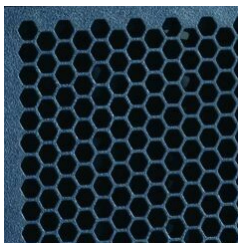
In addition, a **fourth** PCIe slot, **x8** PCIe **Gen 2**, is dedicated for use with an IBM ServeRAID controller.

The RAID daughtercard plugs into a dedicated slot on the planar. This, coupled with the fact that the **SAS/SATA**, **Gigabit Ethernet**, **systems management** and **video** controllers are integrated onto the system board, means that all PCI/PCIe adapter slots are all *available*, which provides a wide degree of latitude in expansion options.

Ultra-Efficient Cooling

Strategically located fans, combined with efficient airflow paths, provide highly effective system cooling for the x3200 M3, known as **Calibrated Vectored Cooling**. The server includes **three** system fans, plus a fan in the power supply.

The fans automatically adjust speeds in response to changing thermal requirements, from minimum RPMs to maximum, depending on the zone, redundancy, and internal temperatures. When the temperature inside the server increases, the fans speed up to maintain the proper ambient temperature. When the temperature returns to a normal operating level, the fans return to their default speed.



Why not simply run the fans at 100% capacity all the time? For several good reasons: to reduce the ambient noise, reduce the wear-and-tear on the fans, and reduce the server power draw. The reduction in ambient noise and power draw may be relatively minor for a single server, but put dozens or hundreds in a data center and it can make a big difference!

In addition, the server uses **hexagonal ventilation holes** in the chassis. Hexagonal holes can be grouped more densely than round holes, providing greater airflow through the system cover.

This cooling scheme is important because newer, more powerful, processors generate a significant amount of heat, and heat must be controlled for the system to function properly.

Other Features

- **Second 430W power supply** — Provides redundant power. (Model-dependant or via CTO.)
- **Seven USB 2.0 ports** — Provides flexibility to add high-speed external devices. The USB 2.0 specification supports up to 480Mbps transfer rates. (Note: Not all USB 2.0 devices are capable of achieving this rate.) Two ports are provided on the front of the server, four are on the back, and one is internal to support a hypervisor USB key or a USB-interface tape drive.
- **Tower-to-Rack Conversion Kit** — This option allows hot-swap x3200 M3 models to be installed in a rack.
- **Toolless chassis** — The cover can be opened without tools, and many components can be installed or removed and replaced without tools, including the optical drive, simple-swap and hot-swap HDDs, PCI and PCIe adapters, as well as the integrated RAID controller. This can save a servicer significant time.

Extensive System Support Features

The IBM services and technical support portfolio provides world-class, consistent, high-quality service and support. The x3200 M3 server offers a number of tools and services designed to make ownership a positive experience. From the start, IBM programs make it easier for customers to plan for, configure and purchase System x or xSeries servers, get them running and keep them running long-term. These features include IBM ServerProven®, the IBM Standalone Solutions Configuration Tool, IBM System x and BladeCenter Power Configurator, IBM ServerGuide, IBM Systems Director Service and Support Manager,

[7] The slot accepts x1 or x4 adapters; however the slot provides x1 throughput only.

Product Customization Services and extensive technical support offerings.

The IBM **ServerProven** program provides the confidence that specific options and operating systems have been tested on the server and are officially supported to work together. It is updated frequently to ensure that the latest compatibility information is always at your customers' fingertips.

The IBM **Standalone Solutions Configuration Tool** (SSCT) is a downloadable tool that simplifies the often complex chore of configuring a full rack of servers (including blade servers) and confirming that you have all the cables, power distribution units, KVM (keyboard, video and mouse) switch boxes and other components you need, as well as the proper airflow clearances, electrical circuits and other environmental conditions.

IBM **System x and BladeCenter Power Configurator** helps IT managers plan for data center power needs, by providing the following information for specific configurations of System x and BladeCenter systems: *power input* (watts), *PDU sizing* (amps), *heat output* (BTUs), *airflow requirements through chassis* (CFM), *VA rating*, *leakage current* (mA), and *peak inrush current* (amps).

IBM **ServerGuide** (installed from CD) simplifies the process of installing and configuring System x and xSeries servers. ServerGuide goes beyond mere hardware configuration by assisting with the automated installation of the Microsoft® Windows® Server® 2003 and 2008 operating systems, device drivers and other system components, with minimal user intervention. (Drivers are also included for support of Novell NetWare, Red Hat Linux and SUSE LINUX.) This focus on deployment helps customers reduce both their total cost of ownership and the complexity that administrators and technical personnel face.

IBM Systems Director Service and Support Manager (previously called IBM Electronic Service Agent) is an innovative "call home" feature that allows System x and BladeCenter servers to automatically report hardware problems to IBM support, which can even dispatch onsite service if necessary to those customers entitled to onsite support under the terms of their warranty or an IBM Maintenance Agreement. Service and Support Manager resides on a server and provides electronic support and problem management capabilities through a highly secure electronic dialogue between your systems and IBM. It monitors networked servers for hardware errors and it can perform hardware and software inventories and report inventory changes to IBM. All information sent to IBM is stored in a highly secure database and used for improved problem determination.

Additional services include hardware warranty upgrades and factory-installed **Product Customization Services** (PCS), such as asset tagging, hardware integration, software imaging and operating systems personalization.

IBM offers extensive **technical support** by phone and via the Web. Support options include links to forums/newsgroups, problem submission, online shopping support, service offerings, device drivers for all IBM product lines, software downloads and even upcoming technical seminar worldwide schedules and registration. Also available are remote installation, configuration and usage support for System x and xSeries hardware and software, as well as onsite custom services to give customers the level of expertise they require.

IBM Maintenance and Technical Support solutions can help you get the most out of your IT investment by reducing support costs, increasing availability and simplifying management with integrated support for your multiproduct, multivendor hardware and software environment. For more information on hardware maintenance, software support, solution support and managed support, visit http://**ibm.com**/services/maintenance.

Advanced Systems Management Capabilities

The x3200 M3 has a high level of systems management capabilities that are well-suited to remote locations as well as to stand-alone environments. Features include **UEFI, IMM**, IBM ToolsCenter, IBM Systems Director Active Energy Manager, Automatic Server Restart, Wake on LAN support, PXE support, text console redirect, Predictive Failure Analysis, and IBM Systems Director.

The **IMM** provides industry-standard **Intelligent Platform Management Interface** (**IPMI**) **2.0**-compliant systems management. It provides a number of important system functions, including:

- Monitoring of system and battery voltage, system temperature, fans, power supplies, processor and DIMM status
- Fan speed control
- Product ID and Family ID detection
- Highly secure remote power on/off
- System reset control
- NMI/SMI detection and generation

- System diagnostic LED control (power, HDD, activity, alerts, heartbeat)
- IPMI over LAN
- Serial Over LAN
- Proxy server support
- LAN messaging and alerting
- Predictive Failure Analysis for system fans
- Web-based out-of-band control
- SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol) support
- Text console redirection over LAN
- VLAN support
- Enhanced authentication and encryption algorithms (RMCP+, AES)
- Latest OS failure screen capture
- Local update of IMM firmware
- Firmware firewall
- Support for IPMI v2.0 compliant management software (e.g., xCAT)
- Other optional IPMI commands

The IMM alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions—even if the server has failed.

The x3200 M3 also supports an optional **IBM Virtual Media Key** for additional systems management capabilities, including:

- Graphical console redirection over LAN
- Remote virtual floppy and CD-ROM
- High-speed remote redirection of PCI video, keyboard and mouse

IBM **ToolsCenter** consolidates 42 needed tools for managing servers individually into an integrated suite of 8 tools. They are organized by function: deployment, updates, configuration and diagnostics. Tools are now simpler to access and use with a single webpage for access, a common look and feel and a common command line interface for the scripting tools. The ToolsCenter **Bootable Media Creator** offers significantly more functionality than past tools with the ability to add more tools to the bootable image and to automatically download the bootable environment if needed. Bootable Media Creator allows you to create bootable CDs, DVD, and USB keys for updates customized to your systems.

IBM developed IBM **Systems Director Active Energy Manager** to put control of system power-saving features at the fingertips of administrators. Active Energy Manager is designed to take advantage of new features, such as monitoring power usage and balancing the performance of the system according to available power input. It provides the ability to plan and predict power consumption based on your hardware configuration. It also helps enable you to reduce the infrastructure required for redundancy, by using fewer servers on smaller power feeds and potentially lowering your overall data center support costs. It does this by inventorying all components, then adding up the total power draw and tracking the usage. It also includes power management features to help administrators manage or reduce power usage.

Automatic Server Restart (ASR) helps reduce downtime by restarting the server automatically in the event of a system lockup. ASR technology is a combination of hardware circuitry tied into the server's system reset function and a device driver. As long as the server continues running, the ASR watchdog timer will keep being reset, but if the operating system crashes or the hardware freezes somehow the ASR software will be unable to reset the hardware timer. If the timer is not reset within five minutes, it automatically triggers the ASR hardware, which immediately restarts the server (and logs an ASR event with IBM Systems Director). These features are designed so that *no more than five minutes can pass before the server is restarted*.

Wake on LAN permits the server to be remotely powered on if it has been shut off. Once powered up, the server can be controlled across the network, using the **Preboot Execution Environment** (PXE).

Like Wake on LAN, PXE is system firmware. It enables software such as the optional **IBM Remote Deployment Manager** to take control of a system before the BIOS, operating system or applications are loaded (using Wake on LAN/PXE) and lets an administrator perform many low-level tasks remotely that would otherwise require a visit to each system. These tasks may include such things as formatting a hard disk drive, updating system firmware, or deploying a Windows or Linux operating system.

Text Console Redirection support allows the administrator to remotely view x3200 M3 text messages over serial or LAN. An optional upgrade to the Virtual Media Key adds graphical console redirection.

Predictive Failure Analysis (PFA) is designed to allow the system to detect impending failure of supported components (memory, voltage regulator module (VRD), fans, and hot-swap HDDs) *before* actual failure, and alert the administrator through IBM Systems Director. This gives you the ability to *replace* the failing component *before* it fails, resulting in increased uptime.

IBM Systems Director software for advanced workgroup management is included with the x3200 M3. IBM Systems Director comes with a portfolio of tools, including **IBM Systems Director Active Energy Manager**, **Service and Support Manager**, and others. *System Availability* (a no-charge download) and *Capacity Manager* (sold separately) are available as add-ons for additional server management and increased availability. IBM Systems Director provides a single uniform graphical interface for all of these systems management functions. IBM Systems Director enables you to customize thresholds and monitor system components (for things like temperature, voltage regulation, etc.) to help maximize uptime.

Key Options

IBM options for System x servers let you take your servers to a higher level

You rely on System x options to supply a complete solution for your business needs. Options help you create an optimized server system to meet your data protection, storage and availability needs. Every IBM option is designed and tested for peak performance and flexibility, helping to maximize your return on investment. The combination of System x servers and options lets you keep your fingers on the pulse of your business.

Memory — Memory is a significant factor in systems application performance. Adding more memory to a System x server is one of the most effective ways to increase application performance. For best performance in a server with a **dual-core** processor, there should be twice as much memory available as for a single-core processor. A **quad-core** processor should have twice as much memory as a dual-core processor.

Hard Disk Drives — IBM hard disk drives help customers improve the transaction and cost performance of their System x servers. The choice of hard disk drives can be a critical aspect of maximizing the I/O throughput of the system. **SAS** hard disk drives (3.5-inch) are available for the x3200 M3 with capacities of **2TB** at **7,200** RPMs and **600GB** at **15,000** RPMs. Enterprise-class **SATA** hard disk drives are available with capacities of **2TB** (3.5-inch) at **7,200** RPMs and up to **750GB** at **10,000** RPMs. In addition, **2.5-inch SAS** drives with capacities of **500GB** at **7,200** RPMs, up to **600GB** at **10,000** RPMs, and **146.8GB** at **15,000** RPMs are supported in some models.

IBM ServeRAID Controllers — System x servers using ServeRAID technology allow companies to build a reliable foundation for business-critical computing. IBM ServeRAID technology allows an array consisting of multiple physical hard disk drives to be treated as one logical drive. ServeRAID technology also allows data to be stored redundantly, across multiple hard disk drives— enhancing both the integrity and the availability of the data. SAS and SATA ServeRAID controllers offer enhanced performance due to onboard processors and cache. Because IBM ServeRAID controllers can help significantly improve data transfer rates, this technology is extremely effective when implementing demanding, transaction-oriented applications. By employing the advanced fault tolerance of IBM ServeRAID technology, companies can effectively implement networked business systems that require large amounts of storage space for data and applications that must be available for their businesses to continue operating.

The **ServeRAID-BR10il V2 SAS/SATA Controller** offers **RAID-0/1/1E** support, with up to **3Gbps** per SAS port. The **ServeRAID-M1015**, x8 PCIe and **6Gbps**, offers RAID-0/1/10; optionally RAID-5 with **SED** support. The **ServeRAID-M5014**, x8 PCIe and **6Gbps**, provides **256MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup). The **ServeRAID-M5015**, x8 PCIe and **6Gbps**, has **512MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup. The **ServeRAID-M5025** (x8 PCIe, provides **512MB** cache, battery backup, RAID-0/1/10/5/50 (optionally RAID-6/60 with SED), and supports up to 9 external **System Storage EXP3000** expansion units). The **ServeRAID M1000 Advance Feature Key** adds RAID-5 and SED support to the ServeRAID-M1015. Similarly, the **ServeRAID M5000 Series Advance Feature Key** adds **RAID-6/60** with **SED** support to the M5014 and M5015. The **ServeRAID M5000 Series Battery Key** adds **battery backup** support to the M5014.

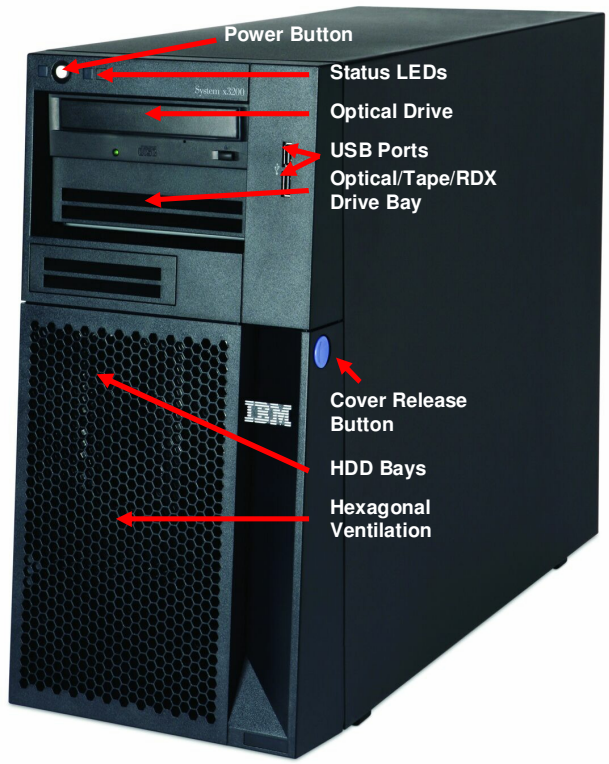
External Storage — The IBM **System Storage EXP700** and **EXP810** expansion units, as well as the **DS3000, DS4000, and DS5000** series storage subsystems, comprise a powerful and broad shared storage family with integrated management software designed to meet midrange and enterprise needs.

Power Supply — A second high-efficiency redundant **430W** power supply is available for the x3200 M3. (Model-dependant or via CTO).

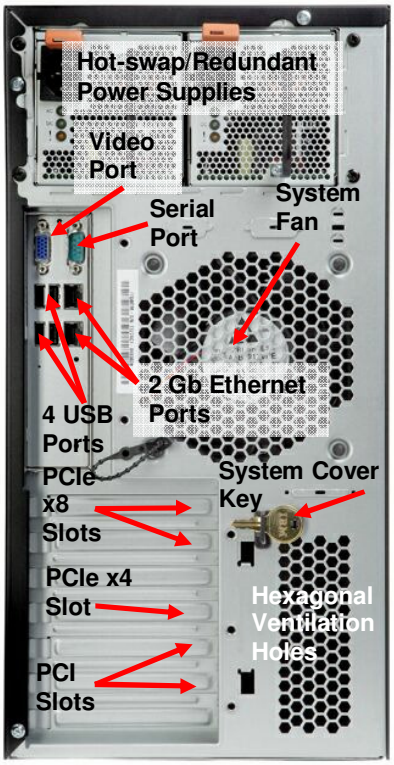
Virtual Media Key — The x3200 M3 includes a plethora of systems management features built-in; however, sometimes additional management capability is needed. In those situations, the Virtual Media Key not only offers powerful new features, it does so without taking up a valuable adapter slot, instead using a dedicated connector on the motherboard.

x3200 M3 Images

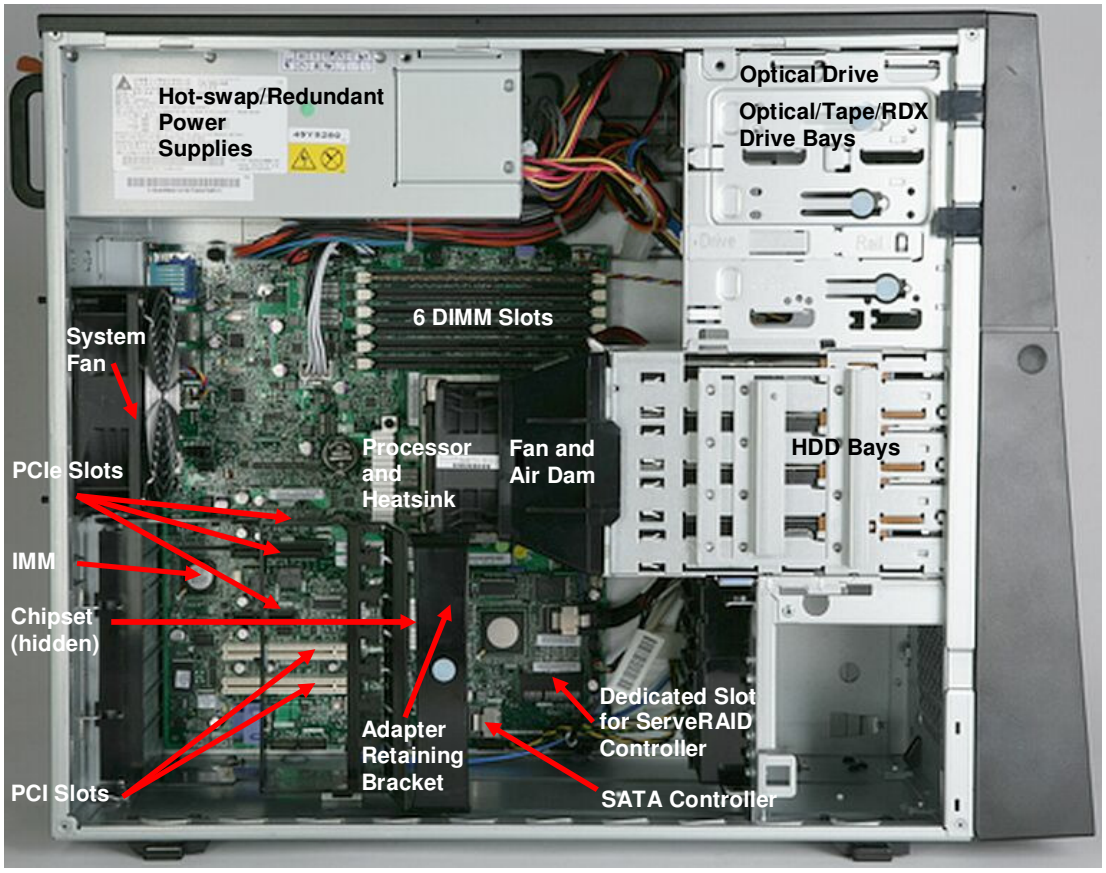
Front View



Rear View



Interior View



x3200 M3 Specifications				
Machine type	**7327-22x, 32x, 42x, 54x, 62x, A2x, B2x, C1x, C2x (1 yr. warranty)** **7328-22x, 32x, 42x, 54x, 62x, A2x, B2x, C1x, C2x (3 yr. warranty)**			
Form factor	Tower (hot-swap models convertible to 5U rack)			
Processor type	**Quad-core Xeon (X3400 Series)** **2.4GHz** X3430 (C1x/C2x), **2.53GHz** X3440 (42x), **2.67GHz** X3450 (54x), **2.8GHz** X3460 (62x), **2.93GHz** X3470 (CTO), **3.06GHz** X3480 (CTO)	**Dual-core Xeon (L3400 Series)** **2.26GHz** L3406 (CTO)	**Dual-core Celeron (G1100 Series)** **2.26GHz** G1101 (22x)	
		Dual-core Pentium (G6900 Series) **2.8GHz** G6950 (A2x)	**Dual-core Core i3 (500 Series)** **2.93GHz** 530 (32x), **3.06GHz** 540 (B2x), **3.20GHz** 550 (CTO)	
Maximum processor power draw	**95W**—C1x/C2x, 42x, 54x, 62x, X3470/X3480 (via CTO)	**73W**—22x, 32x,,A2x, B2x, Core i3-550 (via CTO)	**30W**—L3406 (via CTO)	
# of processors standard / maximum	1 / 1			
Internal L3 cache	**8MB** (1 unified 8MB)—C1x/C2x, 42x, 54x, 62x, X3470/X3480 (via CTO	**4MB**—32x, B2x, Core i3-530/550 (via CTO), Xeon L3406 (via CTO)	**3MB**—A2x	**2MB**—22x
Chipset	Intel 3420			

x3200 M3 Specifications				
Standard / maximum memory[8]	**2GB** (2 x 1GB) / **32GB RDIMM**, **16GB UDIMM** (42x, 54x, 62x, C1x/C2x, CTO)		**1GB** (1 x 1GB) / **16GB UDIMM** (22x, 32x, A2x, B2x, CTO)	
Memory types supported	Unbuffered PC3-8500R-777 (**1066MHz**) DDR3 ECC (non-Chipkill); Registered PC3-10600 (**1333MHz**) DDR3 ECC (non-Chipkill)			
Memory access speed	**1333MHz** (42x, 54x, 62x, C1x, C2x, B2x)		**1066MHz** (A2x)	
DIMM capacities supported	1GB, 2GB, 4GB UDIMMs; 1GB, 2GB, 4GB, 8GB RDIMMs			
# of DIMMs standard	**2 RDIMMs** (42x, 54x, 62x, C1x/C2x)		**1 UDIMMs** (A2x, B2x)	
# of DIMM sockets total / available	**6** / **4 RDIMMs** or **4** / **2 UDIMMs** (42x, 54x, 62x, C1x/C2x)		**4** / **3 UDIMMs** (22x, 32x, A2x, B2x	
# of DIMMs supported	1, 2, or 4 **UDIMMs** or 1, 2, 4, or 6 **RDIMMs** (42x, 54x, 62x, C1x/C2x)		1, 2, or 4 **UDIMMs** (22x, 32x, A2x, B2x)	
Online spare memory supported	No			
Memory mirroring supported	No			
# of drive bays total / available	11 / 10 (2.5-inch models)		7 / 6 (3.5-inch models)	
# of HDD drive bays total / available	**8** / **8** 2.5-inch (CTO)		**4** / **4** 3.5-inch (22x, 32x, 42x, 54x, 62x, B2x, C1x/C2x, CTO)	
# of 5.25" bays total / available	2 / 1 (optical drive installed)			
Maximum HDD capacity standard	**8TB** (4 x **2TB**) 3.5-inch **hot**-swap **SATA II**	**8TB** (4 x **2TB**) 3.5-inch **simple**-swap **SATA II**	**8TB** (4 x **2TB**) 3.5-inch **hot**-swap **SAS**	**4.8GB** (8 x **600GB**) **2.5**-inch **hot**-swap **SAS**
HDD capacities supported	**3.5-inch SATA** 250, 500, **750GB**—**10K** RPMs**;** 1 or **2TB**—**7.2K** RPMs	**3.5-inch SAS** 146.8, 300, 450, **600GB**—**15K** RPMs**;** 1 or **2TB**—**7.2K** RPMs	**2.5-inch SAS** 73.4, **146.8GB**—**15K** RPMs; 146.8, 300**, 600GB**—**10K** RPMs; **500GB**—**7.2K** RPMs	
# of HDDs standard	None			
Disk drive technology	3.5-inch **hot**-swap **SAS**/**SATA** (42x, 54x, 62x, C2x)	3.5-inch **simple**-swap **SATA** (A2x, B2x, C1x)	2.5-inch **hot**-swap **SAS** (CTO)	
Integrated disk controller	Four-port ServeRAID-**BR10il** SAS/SATA—hot-swap models		Four-port SATA (via chipset)—simple-swap models	
# of disk drives supported *per port*	1			
Integrated RAID controller	ServeRAID-**BR10il** (**0MB** cache)---**hot**-swap models only—RAID 0/1/1E			
Optional RAID controllers supported	ServeRAID-**MR10i** ServeRAID-**MR10is Vault** ServeRAID-**M1015** SAS/SATA Controller ServeRAID-**M5014** SAS/SATA Controller ServeRAID-**M5015** SAS/SATA Controller ServeRAID-**M5025** SAS/SATA Controller			
Internal backup drives supported	1 **half-high** 5.25-inch tape drive, CD-RW, or RDX Removable Hard Disk Storage System			
# of optical drives standard	1 SATA **DVD-ROM** (in dedicated 5.25" bay)			
Optical drives optional	Multiburner			
# of diskette drives standard	None (USB-attach)			
# of adapter slots total / available	6 / 5			

[8] Maximum memory and disk capacity may require the replacement of standard components with the largest supported component available.

x3200 M3 Specifications		
# of PCI-E x8/x8 Gen 2 slots (8GBps)	**2** full-height/full-length	
# of PCI-E x4/x4 Gen 2 slots (4GBps)	**1** full-height/full-length (dedicated to ServeRAID controller)	
# of PCI-E x4/x1 slots (1GBps)	**1** full-height/full-length	
# of PCI-X/66 slots (500MBps)	**None**	
# of legacy 33MHz legacy PCI slots	**2**	
# of video ports	1	
Video controller	Matrox G200eV graphic controller integrated in IMM	
Video memory	16MB DDR2 standard (shared with IMM)	
Maximum video resolution at 32-bit color	**1024x768** resolution (analog), with a color depth of 32 bits at **85Hz**; **1440x90** resolution (digital), with a color depth of 32 bits at **60Hz**	
Gigabit Ethernet controller	2 single-port Intel 82574L	
# of Gigabit Ethernet ports	2 (rear)—1 shared for systems management	
# of RS485 ports	None	
# of serial ports	1 (rear)	
# of parallel ports	None	
# of PS/2 mouse ports	None (USB-attach)	
# of PS/2 keyboard ports	None (USB-attach)	
# of USB 2.0 ports	**6** *external* ports (2 front, 4 rear), plus **1** *internal* connector for hypervisor USB key or tape drive	
Integrated systems management controller	Yes (IMM)	
Optional systems management adapter	Virtual Media Key for remote presence upgrade	
Light path diagnostics support	None (lighted LEDs next to DIMM sockets go out if DIMM fails)	
Predictive Failure Analysis support	Memory, voltage regulator module (VRD), HS HDDs, and fans	
Hot-swap/redundant power supported	**Yes** / **Yes** (54x or via CTO)	**No** / **No** (all other models)
# of power supplies standard / maximum	2 / 2 (54x or via CTO)	1 / 1 (all other models)
Power supply size	**430W** universal, autoswitching (54x or via CTO)	**401W** universal, autoswitching (all other models)
# of fans/blowers standard / maximum	3 / 3 (plus one fan per power supply)	
Hot-swap/redundant fans supported	No	
Heat emitted: minimum / maximum per hour	188 BTUs per hour (55 watts) / 1784 BTUs per hour (523 watts)	
Maximum altitude	7,000 ft; 2,133 m	
Operating temperature range	50 – 95º F; 10 – 35º C (up to 3,000 ft / 914.4 m); 50 – 90º F; 10 – 32º C (3,000 ft to 7,000 ft / 914.4m to 2,133m)	

x3200 M3 Specifications		
Operating humidity range	8-80%	
Dimensions (HWD) / weight	17.25" (438.2mm) **H** 8.5" (215.9mm) **W** 21.25" (539.8mm) **D** 30.4" (772mm) **D** (with redundant power)	43 (minimum) – 47 **lb** (maximum) 19.6 – 21.4 **kg**
Operating systems supported	Microsoft Windows Server 2008 (Standard/Web/Enterprise Editions) 32/64-bit, Windows Small Business Server 2008 (SE/PE) 64-bit, Microsoft Windows Server 2003 & R2 (Standard/Web/Enterprise Editions) 32/64-bit, RHEL 4/5 32/64-bit with and without Xen, Red Hat 5 Workstation 64-bit, SLES 10/11 32/64-bit with and without Xen, VMware 4/4i	
Length of limited warranty	**3 years** (parts and labor)[9] — Machine Type **7328**	**1 year** (parts and labor) — Machine Types **7327**

The Bottom Line

The x3200 M3 is an extremely powerful entry system, incorporating leading-edge industry-standard features and adding IBM-unique innovations:

Price/Performance

- **High-throughput processors** — A choice of **2.4** to **3.06GHz quad-core** Xeon or **2.26** to **3.2GHz dual-core Celeron, Pentium**, or **Core i3** processors; or low-voltage **2.26GHz dual-core Xeon** processors
- **Low-energy-draw dual-core Xeon** processor, to help save you money on energy usage
- **Large cache** — **2MB**, **3MB**, **4MB** (dual-core), or **8MB** (quad-core) of L3 processor cache (processor-dependent)
- **High-performance memory access** — **1066MHz** or **1333MHz** (model-specific)
- **High-performance disk technology** — Integrated **SAS**/**SATA** controller and slotless *hardware*-based **RAID** controller (standard in hot-swap models; optional in simple-swap models)
- **High-performance external expansion** — **Seven** 480Mbps **USB 2.0** ports (two front, four rear, one internal)
- **High-performance communications** — Integrated **dual-port Gigabit Ethernet** controller
- **Fast I/O** — **Five PCIe Gen 2** adapter slots

Flexibility

- **Large memory capacity** — Up to **32GB** of **RDIMM ECC memory** or up to **16GB** of **UDIMM ECC memory**
- **High-capacity disk storage** — Up to **8TB** of internal **3.5-inch hot-swap SATA II** storage or **8TB** of **3.5-inch simple**-swap SATA storage, or **8TB** of **3.5-inch hot-swap SAS** storage, or up to **4.8TB** of **2.5-inch hot-swap SAS** storage
- Support for an **optional half-high tape**, **optical drive**, or **RDX Removable Hard Disk Storage System** drive (in *addition* to the HDDs)
- *Hardware*-based **RAID-0**/**1**/**1E** support *standard* in **hot-swap** models, *optional* in **simple-swap** models; **RAID 10**/**5**/**50**/**6**/**60** support optional in all models; full **hardware disk encryption** support available in all models
- **Six** *available* adapter slots:
  - ❑ **One x8**/**x8**[10] **PCIe Gen 2** slot (8GBps)
  - ❑ **One x8**/**4**[11] **PCIe Gen 2** slot (4GBps)
  - ❑ **One x4**/**x4**[12] **PCIe Gen 2** slots (4GBps)—reserved for ServeRAID controller
  - ❑ **One x4**/**x1**[13] **PCIe Gen 2** slots (1GBps)
  - ❑ **Two 33MHz** legacy **PCI** slots

[9] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. IBM makes no representation or warranty regarding third-party products or services including those designated as ServerProven or ClusterProven. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

[10] The x8/x8 slot can accept x1, x4, or x8 adapters running at x1, x4, or x8 throughput, respectively.

[11] The x8/**x4** slot can accept x1, x4, or x8 adapters running at x1, x4, or **x4** throughput, respectively.

[12] The x4/x4 slot can accept x1 or x4 adapters running at x1 or x4 throughput, respectively.

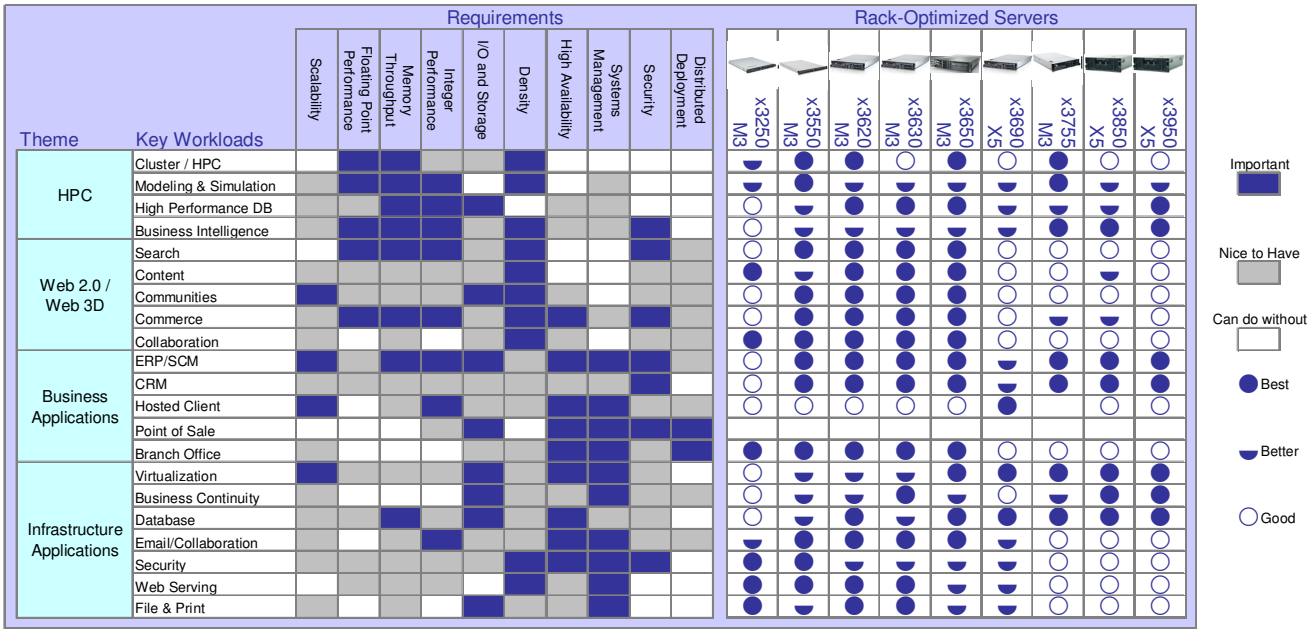
[13] The x4/**x1** slot can accept x1 or x4 adapters running at x1 throughput.

Manageability, Serviceability and Availability

- **IBM Systems Director** systems management software, including:
  - ❑ IBM Systems Director Active Energy Manager
  - ❑ IBM Service and Support Manager
- **Integrated Management Module** (IMM):
  - ❑ **IPMI 2.0** compliance, including highly secure remote power control
  - ❑ **Text console redirection** systems management standard
- Support for **highly available** *hardware*-based **RAID-1**/**1E** arrays standard, without consuming an adapter slot
- **Hot-swap SAS, hot-swap SATA,** or **simple-swap SATA** hard disk drives, for quick and simple installation and replacement of drives
- **Ultra-efficient cooling**
- Second **hot-swap**/**redundant power supply** (model-dependant or via CTO)
- **PFA support** for memory, voltage regulator module (VRD), hot-swap HDDs, and fans
- Optional **tower-to-rack conversion kit**

Server Comparison Chart

The following table shows the suggested uses for the respective IBM System x tower servers, including comparisons of the uses for which each server is best suited:



For More Information

IBM System x Servers	http://**ibm.com**/systems/x
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IBM System x and BladeCenter Power Configurator	http://**ibm.com**/systems/bladecenter/powerconfig
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IBM Systems and Technology Group
Dept. U2SA
3039 Cornwallis Road
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